

GEOLOGY

Physiographic Region

The Missouri portion of the basin lies entirely within the Dissected Till Plain (MDNR 1986) (Figure 2). The topography consists of broad, flat stream valleys and rolling to undulating (occasionally hilly) uplands (Pflieger 1989).

Geology and Soils (USCOE 1963)

Pennsylvanian shales, sandstones, and limestones underlie the basin (Figure 3). The formations dip slightly to the northwest, exposing outcrops of successively younger formations from the mouth to the headwaters. The entire area was glaciated and later subjected to extensive loessial deposits. The predominating soils are derived from the glacial drift and loess, however, the soil types owe their characteristics more to the stage of weathering than the parent material. Loessial silt loam soils cover the greater part of the broad divides and gentle slopes. Glacial silt loams and silty clay loams, usually highly eroded, occur on the slopes. The alluvial soils consist principally of the Wabash series, of which silt loams are the most extensive and most important agriculturally. Generally, the soils are fine-grained and easily erodible.

Watershed Area

The Grand River Basin is the largest basin in Missouri, north of the Missouri River (MDNR 1986). The drainage area of the basin is 7,900 square miles. A majority of the basin (78%) is in Missouri (USCOE 1963). The basin is approximately 150 miles long and 90 miles wide. The drainage pattern is asymmetrical; almost one-fifth of the area is to the south and four-fifths to the north of the main stem which serves as a collector channel for many parallel tributary basins of similar elongated configuration (USCOE 1963). The funnel shape of the basin makes it ideal for flooding in the lower portion of the basin (Wells 1948).

In the Locust Creek basin, watershed area appeared to correlate well with link magnitude (the number of first order segments above any given point on a channel; Osborne and Wiley 1992), though no statistical analysis was performed.

Channel Gradient

There are more than 1,000 third-order and larger streams within the Grand River Basin. Due to the large number of streams within the basin, gradient information was calculated for only fifth-order and larger streams.

Average gradients for streams fifth-order and larger range from 3 feet/mile on Grand River to 44 feet/mile on Pop's Branch (near Princeton, Missouri). Gradient plots were drawn for all streams fifth-order and larger. Higher gradient streams were mostly located in the northwest part of the basin. This area is characterized by steep hills with narrow floodplains. For gradient information on specific streams please contact:

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Figure 2. Location of the Grand River watershed in the natural divisions of Missouri and the landforms of Iowa.

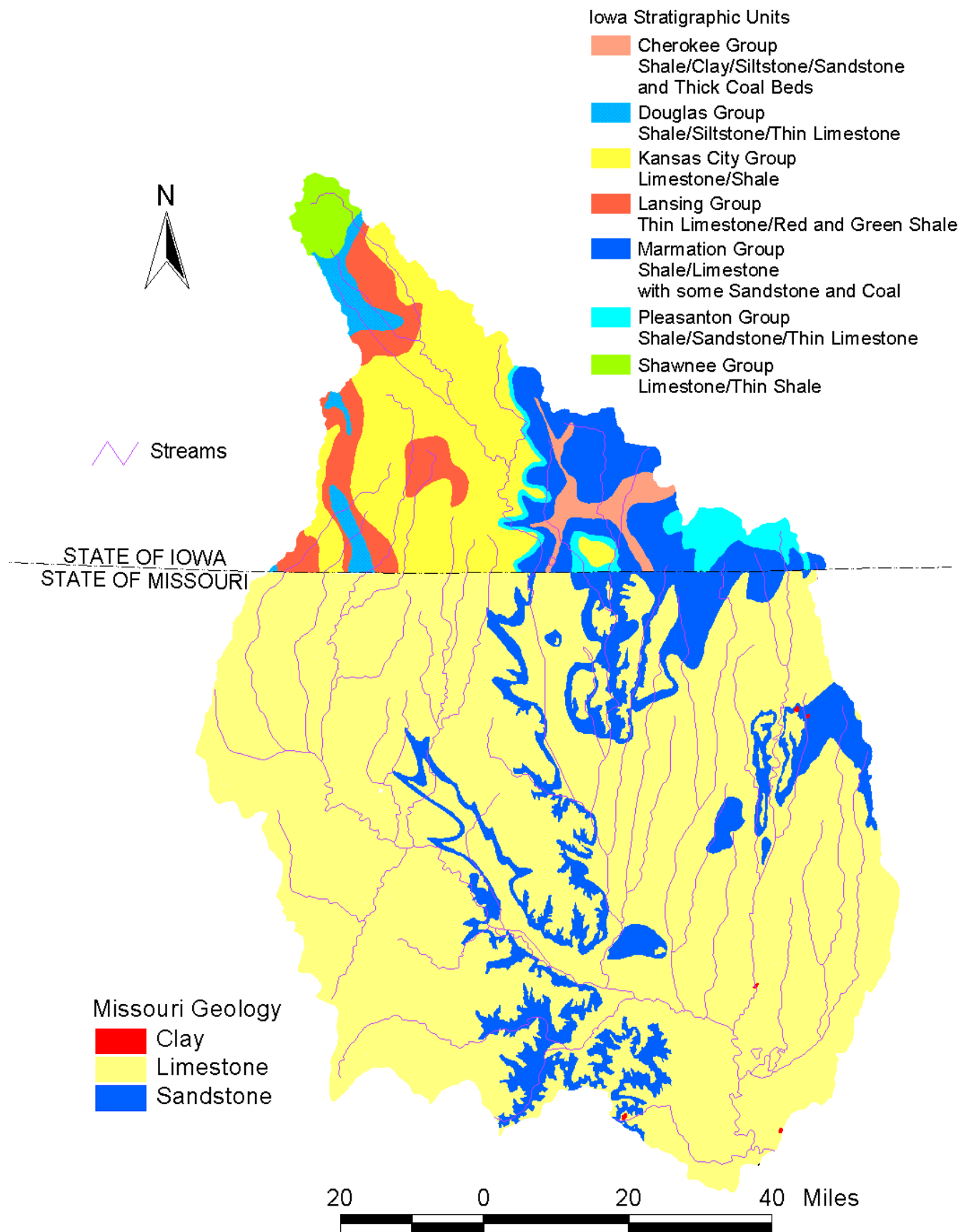


Figure 3. Geology in the Grand River watershed in Missouri and Iowa.